

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

April 2016

Subject ST9 – Enterprise Risk Management

Introduction

The Examiners' Report is written by the Principal Examiner with the aim of helping candidates, both those who are sitting the examination for the first time and using past papers as a revision aid and also those who have previously failed the subject.

The Examiners are charged by Council with examining the published syllabus. The Examiners have access to the Core Reading, which is designed to interpret the syllabus, and will generally base questions around it but are not required to examine the content of Core Reading specifically or exclusively.

For numerical questions the Examiners' preferred approach to the solution is reproduced in this report; other valid approaches are given appropriate credit. For essay-style questions, particularly the open-ended questions in the later subjects, the report may contain more points than the Examiners will expect from a solution that scores full marks.

The report is written based on the legislative and regulatory context pertaining to the date that the examination was set. Candidates should take into account the possibility that circumstances may have changed if using these reports for revision.

F Layton
Chair of the Board of Examiners
July 2016

A. General comments on the *aims of this subject and how it is marked*

1. The aim of the Enterprise Risk Management (ERM) subject is to instil in successful candidates the key principles underlying the implementation and application of ERM within an organisation, including governance and process as well as quantitative methods of risk measurement and modelling. The student should gain the ability to apply the knowledge and understanding of ERM practices to any type of organisation.
2. The ST9 exam generally requires bullet point form or short form essay style answers that apply general principles to directly address specific circumstances. The answers given below are just one possible set of acceptable answers.
3. Candidates are awarded marks for all reasonable answers including different but still reasonable numerical solutions. Marks are awarded for working in the case of numerical answers.
4. Candidates' answers are made up of a series of points. For example, a point can be stating a valid type of risk, describing the type of risk or (part of) a calculation.

B. General comments on *student performance in this diet of the examination*

1. The paper was made up of one moderately long question followed by a long multi-part question, and then one moderately short question.
2. Question 1 covered issues around Solvency II and the Solvency Capital Requirement (SCR); question 2 was a case study based on risk management frameworks for a small business; and question 3 covered asset-liability matching and risk mitigation.
3. As is common practice, the large majority of the questions were:
 - based heavily on bookwork;
 - based on simplified case studies; and/or
 - loosely based on actual and often relatively recent events.
4. The Examiners seek to test the candidate's knowledge of the syllabus. The core reading is an important source for framing questions but not the only source. For this reason, candidates are encouraged to read the financial press and to consider how current news items can be applied to the issues and concepts contained in the core reading.
5. Well-prepared candidates scored acceptably well across the whole paper. The comments that follow the questions concentrate on areas where candidates could have improved their performance.

C. Comparative Pass Rates for the past 3 years for this diet of examination

<i>Year</i>	<i>%</i>
April 2016	42
September 2015	48
April 2015	36
September 2014	39
April 2014	37
September 2013	35

Reasons for any significant change in Pass Rates in current diet to those in the past:

Candidates' marks were closely grouped, and showed less divergence than might have been expected, even within questions. This meant that a small change in the Pass Mark had a large impact on the Pass Rate.

D. Pass Mark

The Pass Mark for this exam was 62%.

Solutions

Q1 (i)

- Overall to aid understanding and communication of risks
- Pricing of products or services
- Assessment of the economic value of the company
- Estimation of the possible volatility of future profits and earnings
- Determination of capital adequacy requirements: regulatory requirements...
- ... and internal economic capital assessments
- Projection of the future capital or solvency position
- Assessment of the effect of risk management and mitigation techniques on profits...
- ... and on capital requirements
- Assessment of the effect of other strategic decisions, e.g. changes in investments...
- ... or new business strategy
- Evaluation of projects

Candidates generally scored well on this question, with a number gaining full marks.

(ii) The internal model could be more suitable because:

- Blue Ltd has very specific and niche risks...
- ... which may not be appropriately captured by the standard formula.
- Higher claim volatility as it is a small company.
- Expect high frequency, low cost claims.
- An internal model specifically designed to measure Blue Ltd's risks could lead to a lower capital requirement...
- ... and thus allow it to use capital more efficiently.
- And it should lead to better understanding and management of the company's risks.

However:

- Blue Ltd is a small company and may not have sufficient historical data to calibrate an internal model.
- Blue Ltd may not have the in-house expertise to develop an internal model.
- Developing and documenting the internal model will incur costs.
- Including use of expensive external consultancy expertise/resources.
- And maintaining it on an ongoing basis could also be more costly than using the standard formula.
- Blue Ltd may find the regulatory approval process onerous...
- ... and in particular demonstrating compliance with the six tests including the "use test".

Candidates generally scored well on this question.

(iii) Model 1:

- moderate run time – could be run overnight
- automatic population of returns reduces the overall time needed...
- ... and reduces the possibility of human error
- appropriate matching assets may not be available in the market
- involves a reasonable amount of approximation
- in particular, can be difficult to find assets which will match the liability profile under extreme events
- produces a distribution of outcomes resulting in estimates of the shape and range of possible outcomes

Model 2:

- uses the least amount of approximation/most accurate
- but the highest number of real world scenarios are required
- calibration may be the most challenging for this model
- the existing reserving model may be unable to generate the results required for a nested stochastic model
- very long run time at nearly a day...
- ... which could be too long in a market crash where a rapid result is needed
- greatest risk of a model failure, requiring a restart and further delays
- does not populate the returns so takes more time / increased possibility of human error
- may be hard to test on account of complexity
- may also be relatively opaque and not fully understood
- may introduce reliance on key technical personnel

Model 3:

- has the fastest benchmark runtime
- can perform high numbers of re-runs
- closed form deterministic models can be the easiest to explain
- may be the easiest to validate
- and to document
- and to gain engagement across the business from under the “use test”
- however it has the greatest level of simplification
- the simplifying assumptions can make it difficult to model complex features
- such as non-linearities between risks
- e.g. due to management actions
- such as paying some claims that the insurer is not obliged to pay (e.g. manufacturer defect on a particular model) to avoid bad publicity, or switching investment strategy
- and less accurate modelling of guarantees

Candidates generally scored well on this question.

(iv)

- Cost of software
- Cost of corporate/single use licences
- Detailed contract terms
- Cost/amount of hardware required to optimise the system
- Whether development can be carried out in-house or must be carried out by the vendor
- If it must be carried out by the vendor, the lead time
- Documentation on the testing carried out by the vendor
- Ongoing support – help lines, bug fixes
- Training provided
- Documentation available to support the model
- Whether multiple access is possible
- Information on the installation process (costs, time and requirements)
- Whether web-based or requiring special machines
- Ease of use
- Whether a trial period is offered
- Where is user information stored and how is protected and backed up
- Approach taken to model updates
- Warranty offered
- Cooling-off period and contract break clauses
- Ability to run sensitivities
- Ability to perform stress and scenario testing
- How easily it supports P&L attribution outputs
- List of other users
- Testimonials from other users
- Financial information on the vendor (to judge their security and thus ability to continue to support the model)
- Credit rating of the vendor, if applicable
- Details of any other options / models

Candidates generally scored well on this question.

Q2 (i)

- Hold workshops to identify risks...
- ...to define them...
- ... to estimate their maximum possible upside and downside and...
- ... to roughly estimate the range/probabilities.
- Design and produce a risk register.
- Produce a simple risk appetite statement.
- Produce a simple risk tolerance statement.
- Establish a risk management committee.
- Hold risk management committee meetings quarterly.
- Produce regular simple broad risk reports...
- including e.g. risk lists with limits and traffic lights.

- Appoint someone as risk manager...
- ... who can coordinate with the accountant and the gym managers.
- Update the risk register, risk appetite and risk tolerance statement and the risk committee report format and content say annually.

This question was not well answered by many, with several candidates scoring no marks and only a handful doing well. However, the range of marks scored was high. The key issue was that many candidates proposed activities relating to the mitigation of individual risks rather than the ERM process, and as such did not score highly.

(ii) **Assumptions**

- Assume that the loan is secured on both the properties and the business.
- It is possible that Joanna also personally guaranteed the loan or put up some additional form of collateral e.g. her home.
- Assume that the mortgage repayments are interest only with the principal being repaid most likely from either a replacement mortgage or sale of the properties.

Credit risk at the outset

- Credit risk is a product of the probability of default and the loss given default.

Probability of default

- Need to assess this for each of the key possible reasons for default.
- Reason 1 – The chance that the company (and possibly Joanna) is not able to meet the regular repayments for the requisite period of time that triggers a default.
- The bank is likely to use an empirical model based on responses to standardised questions
- e.g. Fair Isaac's FICO score.
- The model will be dominated by income and assets convertible into income.
- The model will be calibrated with the experience of other similar loans over several years...
- ... including in severe economic downturns.
- Expert judgement (from credit experts at the bank) may be utilised if this particular loan is unusual relative to the bank's past experience.
- That is, the anticipated levels of interest cover (income/interest) will be stressed based on the historical performance of other loans to produce a probability of default estimate.
- The future income component will be based on conservative business plan projections (as the company is a start-up)...
- ... including any spare funds in the company at the outset ...
- ... and Joanna's income if she acted as guarantor.

- Reason 2 – The chance that the property values and any residual value in the equipment together with the value of any other collateral are less than the loan principal at any time during the loan term.
- The probability of default from reason 2 will be largely a macro-economic calculation based on the probability of the entire town(s) becoming a permanently unpopular place to live and work.
- However, it is not likely to be a big risk during the 10 year loan term if the town(s) is/are currently popular.
- And it is not likely to trigger a default if the company is trading profitably and Joanna considers that the reduced property values are more than offset by the value of the business and/or Joanna considers that the reduced property values are temporary.
- Therefore the probability for reason 2, being less material than for reason 1, may be determined more approximately.
- In practice, the overall probability of default is approximately the aggregate of the probabilities derived from each of the two reasons.

Loss given default

- This is the estimated net sale proceeds of the properties and gym equipment ...
- ... together with the value of any guarantees from Joanna ...
- ... less the loan amount outstanding including accrued interest and other charges.
- The value of the business including the fixtures and fittings including the gym equipment will likely to be assumed to be zero at the date of default.
- The net proceeds to the bank from the property sales will be a macro-economic calculation based on future estimates of property values.
- At the outset the market values are likely to be nearly \$4 million compared with the loan of \$3 million.
- In a normal economic environment, property values might increase in most years with some chance of a valuation crash...
- ... meaning that in practice the loss given default calculation will be based on the potential percentage fall in property values in a severe crash.
- The chance of a crash and the fall in value from the crash might depend on property prices in the recent past.
- For example, the future might be different if the recent past had a steep rise or a steep fall in property prices.
- In theory the loss given default should be calculated for each scenario used to estimate the probability of default.
- This is unlikely to be done in practice because the probability of default reason 1 calculation is not specifically scenario based.

Candidates did not score well on this question. No-one gained full marks, and a small number scored no marks at all. The lack of marks generally came from too narrow a range of points being made.

(iii)

- Employ independent non-executive directors (NEDs)
- They will provide independence to decision-making
- ... and provide broader experience.
- They may be selected to bring in fitness experience from other contexts
- Or physiotherapy/massage experience
- But more importantly it would be useful to bring in NEDs with wider business experience, from other industries
- Ensure that the majority of members of the Board are independent
- Therefore may need to ask some of the existing Board to step down...
- ... since they are all fitness related, not independent of the company and not all independent of each other.
- Expand the shareholding now to a wider base than just Joanna
- In particular, offer shares to the other Board members
- This gives them a greater incentive to align their interests with the financial performance of Diamond Fitness
- Separate the Chairperson and CEO roles so that they are held by two different people.
- This avoids too great a concentration of power.
- And reduces the risks arising from conflicts of interest.
- Establish committees of the Board...
- ... in order to deal with specific issues more effectively.
- The members of the committees should all be independent.
- Appraisals should be carried out by the remuneration committee
- The CEO should also be appraised by the other members of the Board
- The accounts need to be audited by a different company than the one producing the accounts
- And these auditors should report into the audit committee
- The Board should meet more frequently than annually...
- ... as key decisions are likely to need to be made more frequently / there could be a very long time between a significant event requiring discussion and a Board meeting
- The committees should also meet more frequently than annually...
- ... and feed reports into the Board
- If not already set, the members of the Board (and committees) need to have clear objectives...
- ... and accountabilities
- A risk committee should be established to monitor the levels of risks to which Diamond Fitness is exposed...
- ... and to set the risk appetite

Candidates generally scored reasonably well on this question, but no-one gained all of the marks available. Again, this was down to there being too narrow a range of ideas.

(iv)

- SWOT analysis
- Identification of strengths, weaknesses, opportunities and threats
- Weaknesses and threats generate downside risks
- Opportunities and threats generate upside potential and ideas for future strategies
- Covers both internal and external risk management contexts
- Risk check list / prompt list / taxonomy / risk trigger questions
- List of risks or risk categories
- Which are used as a reference for prompting identification of the range of risks for this particular organisation
- Lists can be developed from both own company experience and externally documented knowledge
- May use PEST or PESTELI (political, economic, social, technological, environmental, legal, industry) prompts
- Case studies
- including the recent closure of Elite Fitness
- Can suggest specific risks where there are clear parallels between the organisation in question and that in the case study
- And can suggest areas where similar risks might occur in future
- Show the contexts in which risks are allowed to develop
- And the links between various different risks
- Risk-focussed process analysis
- Construction of flowcharts for every process used by the organisation
- Analysis of the points at which risks can occur
- Detailed process descriptions should include who and what is involved at each point
- Requires input from all key areas of the organisation to establish how it does what it does

This question was moderately well answered, but the range of scores was high with a number of candidates scoring no marks and a smaller group scoring full marks. An issue for those scoring less well was often that answers concentrated on *techniques* rather than *tools*.

(v)

- Inexperienced/unpopular fitness instructors in the gym reducing memberships
- Loss of good staff/instructors
- Injury/sickness of key staff
- Reputational risk reducing gym memberships generally as a result of “contagion” from the Elite Fitness newspaper story
- Staff commit fraud
- Staff deal in illegal substances
- Theft of gym equipment

- Breakage of gym equipment
- Gym equipment doesn't function correctly and injures a member who then sues the gym
- Member sustains an injury as a result of a fitness class or treatment session
- Membership data systems fail
- Leak of personal data
- Monthly direct debits are not set up correctly and premiums are not taken
- Membership cards fail and members can't access the gym
- Natural disasters e.g. earthquakes / hurricanes / flood
- Criminal acts e.g. arson
- Serious power failure resulting in the gyms not being able to operate
- Risk of onerous change to regulations governing gym service provision

This question was well answered, with a good number of candidates scoring full marks.

(vi)

- Although holding extra capital can mitigate against the financial impact of operational risk events crystallising...
- ... people, process and systems risks are often better mitigated by additional controls rather than just holding capital.
- Such mitigations normally have wider benefits to the company than just being able to hold less capital.
- E.g. lower profit volatility.
- Operational risks arising from external events tend to be low frequency and high severity...
- ... therefore it is difficult to model and set an appropriate level of capital to be held.
- If there is no other mitigation in place, either a very high amount of capital would need to be held for such events and this might not be possible...
- ... or the amount held would be insufficient under very extreme events.

This question was moderately well answered, with a lack of depth being the usual reason that candidates did not score better.

(vii)

- Trial periods and references for new instructors
- Mandatory continued training for instructors
- Appropriate remuneration, e.g. bonuses based on gym member feedback
- Provide private medical insurance for key instructors to help them recover more quickly from injury/sickness
- Offer the newspaper an article on how "clean" Diamond Fitness is
- Do-check-review process to prevent fraud
- Make very clear position on illegal substances and deal immediately with any suspicions
- Burglar alarms to prevent theft
- Security cameras to prevent theft/arson

- Investment in quality equipment
- Clear notices posted relating to liability to members
- Using legal advisors
- Induction of every new member on the use of the gym equipment and health and safety
- Perform refreshers for members on the use of gym equipment and health and safety
- Backups for IT systems
- Service level agreements for IT systems/support
- Buildings and contents insurance against natural disasters
- Business continuity plans e.g. alternative premises
- Sprinkler system to reduce fire risk
- Back-up power supply
- Keeping pace with regulatory changes / lobbying

This question was very well answered, with a number of candidates scoring full marks, and a good range of points being made.

(viii)

- Since the likelihood of a flood event happening is “very low”...
- ... and significant volume of past data is unlikely to exist....
- ... the best technique would be Extreme Value Theory.

Predictably, as this was a one-mark question, a large number of candidates scored either full marks or no marks. However, more candidates scored poorly than might have been expected.

(ix)

- If available, need flood data from the last 50 years (say)...
- ... from the areas in which each of the three gyms is based.
- Need data that allows modelling of both frequency and severity.
- So the data needs to include both the number of flood events and an indication of the degree of severity of each.
- Information on building repair costs will also be needed...
- ... specific to the three gym properties.
- Expert judgement is likely to need to be applied to adjust the flood data...
- ... to allow for future weather trends not observable in past data...
- ... and to allow for changes to flood defences in the areas.
- E.g. this may be sourced from meteorology/environmental studies.

This part too showed a wide range of results, with a number of candidates scoring full or no marks, but in general this question was well answered.

(x)

- The following risk list shows the risk by name and by type. The potential risk exposure is shown on a scale of 1 to 5 for both frequency and severity with 1 being low and 5 being objective threatening. The scaling is AFTER the impact of any noted risk avoidance, transfer or mitigation strategies that are assumed to be in place.
- For a risk to be a high risk it needs to be both unexpected and material to the company's objectives. For example, the unexpected loss of senior personnel is only a high risk if they cannot be quickly replaced with equivalent personnel.
- Normally risks are assessed against financial objectives such as profit and growth, but not all objectives need to be financial. The two key corporate objectives are assumed to be positive annual profits (of any amount greater than \$50,000 pre-tax being a 5% pre-tax return on equity) and that the gym network remains to be a popular place with local women offering wellness and happiness.

Operational

- Property damage including buildings and equipment, frequency 1, severity 1, assuming transferred with insurance
- Employers' liability, frequency 1, severity 1, assuming transferred with insurance
- General liability (to customers), frequency 1, severity 1, assuming transferred with insurance
- Burglary and theft, frequency 1, severity 1, assuming transferred with insurance
- Fraud and embezzlement, frequency 1, severity 3, assuming mitigated with management, systems and processes, and potentially also transferred with insurance
- Equipment obsolescence, frequency 3, severity 3, assuming mitigated with management, business plan and budgeting
- Property management, frequency 1, severity 4, assuming mitigated with management, business plan and budgeting
- Systems and processes including IT, frequency 3, severity 1, assuming mitigated with management, business plan and budgeting
- Key man, frequency 1, severity 4, assuming mitigated with management, business plan
- Changes to laws and regulations, frequency 1, severity 2, assuming mitigated with management and seeking to adhere to or exceed all existing laws and regulations, health and safety
- Changes to medical advice, frequency 2, severity 1, assuming mitigated by staying informed and having the flexibility to change classes to suit developing medical advice trends

Financial

- Financial market risk – property values, frequency 2, severity 5, Diamond Fitness is heavily exposed to property of a particular type. Assumed to be

mitigated by monitoring values and forecasts and potentially selling and leasing back properties in the future.

- Interest rate risk – frequency 5, severity 4, Diamond Fitness is relatively highly leveraged and needs to keep its membership fees up to meet its interest bill. Interest rates change frequently. If the mortgage loan is floating rate then a sudden rise could bankrupt the business. Assumed not to be mitigated by fixing the interest rate with the bank or buying an interest rate swap with a bank.
- Liquidity risk – frequency 2, severity 2, assuming substantially mitigated through regular gym membership receipts. Potential problem if the gym is susceptible to significant membership cancellations and/or at a particular time of year.
- Credit risk – frequency 1, severity 5, should be very low chance of occurring. Likely to involve only the insurers and direct debit banks which should all be highly credit worthy.
- Counterparty risk – frequency 1, severity 2, relating to contracts with suppliers e.g. of equipment, or providers of the massage/physiotherapy services if contracted rather than members of staff. Assumed to be mitigated through well written contracts and service level agreements with penalty clauses.
- Expense/inflation risk – e.g. increasing payroll costs that cannot be offset against increased membership fees, frequency 3, severity 2, assuming mitigated with management, business plan and budgeting

Customer demand

- Demand – frequency 2, severity 4, assuming mitigated by management, systems and processes to monitor and change and innovate as demand changes e.g. different exercise classes, introduction of new wellness platforms, clubs, chat groups etc..
- Competition – frequency 4, severity 2, competing gyms can be expected to come and go, hold membership drives etc. Assumed to be mitigated through relationships with members, maintenance of reputation and regular refurbishment/update programs.
- Location – frequency 1, severity 5, neighbourhoods change for better or worse over time. The gyms need access to a minimum number of suitable women of appropriate age, interests, incomes etc.. and the neighbourhood needs to continue to be sufficiently safe and clean to keep them there. Assumed to be mitigated by monitoring property values, population trends and crime rates. Potentially selling and relocating in the future.
- Relationship – frequency 5, severity 2, assuming mitigated with regular staff training and regular relationship events to bond the staff and members together
- Reputation – frequency 1, severity 5, assuming mitigated by continuing management focus on branding, public announcements, surveys, member feedback etc.

Other

- Contagion (or systemic) risk – frequency 1, severity 4, large severity potential depending on the actual circumstances, assuming mitigated with high standards and rapid response to events
- Agency risk – frequency 1, severity 1, assuming mitigated through close relationships between key staff members and improved corporate governance and culture

Other assessment considerations

- Many businesses can withstand the crystallisation of one key risk and even two key risks at one time. Corporate failures are often the result of three or more key risks crystallising at the same time. Therefore the correlations between risks would also be important, e.g. high correlation between expense risk and customer demand risk.
- Many risks crystallise and grow over time. These risks can be substantially mitigated and/or avoided if they are identified early and properly managed, so the assessment is strongly dependent on the quality of the mitigation processes and management's ability to identify emerging issues and correct them before they crystallise into large losses.
- In particular, the overall risk exposure of the company depends on the quality and experience of its key personnel and on the effectiveness of its management, systems and processes.
- The company has been operating three gyms for three years and presumably meeting its stated objectives. The assessment assumes that the company's management, systems and processes are all fit for purpose.

Conclusions

- From a financial perspective, Diamond Fitness is most exposed to a combination of falling property values resulting from a declining neighbourhood including declining population, reduced incomes and increased crime. This change will not happen suddenly and can be managed if identified as a business threatening problem. It is also exposed to increasing mortgage loan interest rates if these are floating. However, the company can transfer some or all of this risk and over time and change its membership fees/ numbers of members to compensate for any increased costs if needed.
- From a non-financial perspective, the company's future as a women's only gym is based on its relationship with its members and its reputation. The risks of contagion and neighbourhood decline are relatively low. The risk list suggests that this risk can be mitigated through proper management, monitoring and regular refurbishment, change and innovation.
- There is no particular need to rank the above highlighted risks. They are all important to one or other of the company's stated objectives. They all need to be identified and managed.

This question was not well answered. There are many ways in which this question could be answered, but too many candidates failed to give some sort of ranking of either the frequency or the severity that might be expected with particular risks. The number of risks covered was also low in many cases.

Q3 (i)

- Avoidance: investing a lower proportion in “high risk” assets.
- E.g. avoiding low credit-rated corporate bonds.
- Diversification: by taking on uncorrelated risks.
- E.g. portfolios can be diversified across asset types
- or across sectors
- or across individual stocks / counterparties
- or geographically.
- Greater matching of assets and liabilities.
- Strong internal controls and governance in relation to its investment strategy ...
- ... particularly relating to the use of derivatives, if held.

This question was generally well answered by candidates.

(ii)

- If assets and liabilities are not perfectly matched, then financial market movements can result in the assets falling by more than the liabilities, or the liabilities increasing by more than the assets
- Thus the company has greater risk of becoming insolvent
- Or it may become financially weak, which could generate reputational risk
- If assets and liabilities are mismatched by nature...
- ... this could introduce inflation risk
- E.g. if liabilities are index-linked and assets are not, high inflation poses a risk (or vice versa)
- Equally, if liabilities are fixed and assets are largely equities, the company is at risk from lower than expected equity returns (or any suitable similar example)
- Basis risk arises from mismatching...
- ... to the extent that a hedging instrument is not perfectly matched to what is being hedged (e.g. slightly different indices)
- If asset and liability cashflows are mismatched by term...
- ... this could introduce interest rate risk
- E.g. if assets and liabilities are similar in nature but the duration of the former is greater than the other, the company is at risk if interest rates rise (or vice versa)
- Mismatching cashflows by term also generates liquidity risk...
- ... since assets will have to be sold in order to generate cash to settle outflows, if liability cashflows are of shorter term

- And it generates reinvestment risk if asset cashflows are of a shorter term than liabilities
- i.e. a risk that the rate at which the asset proceeds can be reinvested is lower than anticipated
- If assets and liabilities are mismatched by currency...
- ... this introduces the risk of changes to the foreign exchange rates which reduce the value of assets relative to the value of liabilities.
- In every case, the greater the mismatching between asset and liability cashflows, the greater the risk.
- It is rarely the case that matching can be precise, so there will normally be some related risks remaining.
- The process of determining an appropriate matching portfolio is subject to operational risks (human error etc.).
- Management could intentionally mismatch in the hope of upside risk or increased profits.

This question was reasonably well answered by candidates.

(iii)

- It should be possible to obtain the projected liability cash flows directly from the reserving model...
- ... so it may be a good approach in terms of saving time and resources.
- It would be expected that the actual liability cash flows are lower than the asset proceeds at each time period (due to the prudential margin)
- This reduces liquidity risk
- However, it increases reinvestment risk
- It also means that a higher proportion of assets may be tied up in lower return assets than is strictly needed
- So it may not be the optimal overall balance of risk v. return
- Matching to regulatory net cash flow could result in a lower capital requirement than matching to best estimate cash flows

Many candidates scored well on this question, but a significant minority scored no marks at all. In a number of cases, candidates were unable to identify the key issues.

END OF EXAMINERS' REPORT